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Designing a learning model using the STAD technique with a suggestion system to decrease learners' weakness

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Abstract

The purpose of this research is to synthesize a learning model using the Student Teams - Achievement Divisions (STAD) technique with a suggestion system according to learners' capability to decrease learners' weakness. The research and development methodology is utilized in this study; however only the phase of designing model is presented here. The methodology consists of 6 steps as follows: 1) Studying and analyzing the related principles and theories, 2) Investigating the context of instructional design and learning environments, 3) Synthesizing a framework of the learning model, 4) Designing a learning model based on the framework, 5) Evaluating the learning model by 6 experts and 6) Improving the model. Several learning theories and principles such as constructivist theory, Bloom's taxonomy theory and the principle about media symbol system are used in this work. Two results are shown as follows. Firstly, the learning model comprises of 5 modules that are (1) Test Module, (2) Evaluation module, (3) Suggestion module, (4) Community module and (5) Knowledge bank module. Secondly, the results of the assessment from 6 experts are revealed that the model conforms to learning principles and theories and the experts accept to the usability of the model in a high level at 70.27 % overall. To conclude, the model derived from the

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1. Introduction

Currently, most of learning environments in the real world still focus on knowledge transmission instead of knowledge construction; whereas several educators encourage learners to build their own knowledge (Spiro et al., 1991; Mayer, 1996; Driscoll, 2000; Atherton, 2009; Amornsin laphachai et al., 2012). This conforms to Thai National Education Act 1999 and Amendment Act (No. 2) 2002 stating that the education will be based on the principle that all learners are capable of learning and developing themselves and the students are considered as the most important. To promote this concept, the internet technology and several learning theories can be used to advocate learners' community concentrating on interaction of learners and knowledge construction by learners. The social network originated from the internet technology can be used in education as a medium among learners, teachers and other experts while multimedia technology (Mayer, 2005) is utilized for designing learning environment. To build learners' knowledge, constructivist theory (Vygotsky, 1978; Spiro et al., 1991) can be

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employed while an evaluation model (Kirkpatrick et al., 2006) can be applied to learner's assessment; moreover several theories (Bloom, 1956; Gardner, 1999) help to classify learners according to learners' competency.

The theory of multiple intelligence (Gardner, 1999) indicates that all people have different kinds of intelligences that are learners always have some weakness in their studying; however it is possible to decrease these weakness; and thus the swiftly developed technology and learning theories can be combined together to develop web-based learning environment to enhance capability of learners. From these reasons, the researchers aware of the need to design and develop a learning model using the STAD technique (Stevens et al., 1995) with a suggestion system to decrease learners' weakness. This model is based on multiple learning theories and principles as well as the internet and multimedia technologies.

2. The Purposes of Research

Two main purposes of this study are as follows.

2.1 To design a learning model using the STAD technique with a suggestion system to decrease learners' weakness.

2.2 To evaluate the designed model.

3. The Scope of Research

This section will explain about the scope of research consisting of the target group, the scope of content and the research variable as the following details.

3.1 Target group

The target group utilized in the phase of designing model composes of 6 experts in 3 aspects that are (1) learning content, (2) design based on theories and (3) media and technology.

3.2 Scope of Content

The content employed in this research is a part of the subject of 414365 Computer Network Management at Nakhonratchasima Rajabhat University. The topics of content are IP address, Protocols, Subnet and Supernet.

3.3 Research variable

The research variable studied in this work is a learning model using the STAD technique with a suggestion system to decrease learners' weakness.

4. The Research Instruments

The instruments used in the study are as follows.

4.1 The opinionative of instructional context in the course of Computer Network Management is utilized to study the opinion of lecturers and students about learning context. The questions in the opinionative are open-ended questions.

4.2 The record form of document analysis comprising of 3 aspects of principles and theories that are (1) psychology of learning , (2) science of teaching and (3) principles of media and technology.

4.3 The assessment forms to confirm the quality of the designed model and the usability of the model. The assessment form to confirm the quality of the designed model is created by using the principle of evaluation in web-based learning (Khan et al., 1997) and the principle of assessment in learning environment. Open-ended questions are used in this form. For the assessment form to confirm the usability of the model, the percentage of the appropriation of usability must be defined for each questions.

5. Data Collection and Analysis

The data are collected and analyzed as follows.

5.1 The conditions of learning and teaching collected by the opinionative of instructional context is analyzed by summarizing interpretation.

5.2 The review of literatures are recorded and analyzed by describing and summarizing interpretation. The result from document analysis is used to synthesize a framework of the learning model.

5.3 The designed model derived from the framework is assessed by the experts. The result is analyzed by summarizing interpretation. Three aspects of assessment are (1) learning content, (2) design based on theories and principles and (3) media and technology. For the usability of the model, the average of percentage is calculated for the appropriation of usability.

6. Results

The results of the study in the phase of designing a learning model using the STAD technique with a suggestion system to decrease learners' weakness are as follows.

6.1 The framework of the learning model

The learning model framework based on several major principles and theories consists of five modules that are (1) Test Module, (2) Evaluation module, (3) Suggestion module, (4) Community module and (5) Knowledge bank module as shown in Figure 1.

From Figure 1, five modules in the framework are the elements of the learning model. These modules have details as follows.

1. Test Module

Questions in the Test module are classified into 2 dimensions. In the first dimension, the questions are classified according to the learning level of Bloom's Taxonomy theory. For the second dimension, the questions are categorized in accordance with the type of intelligence in multiple intelligence theory.

2. Suggestion Module

The function of the Suggestion module is automatic analyzing the result derived from the Test module to advice learning resources suitable for learners to fix learners' weakness. In addition, the module will suggest how to group students.

3. Community Module

Two genres of community in the Community module are social network and face-to-face meeting. The social network includes both synchronous and asynchronous communications. Learners of each group in community compose of weak learners and strong learners according to the type of intelligence. The learners' classification corresponds to the STAD technique.

4. Knowledge Bank Module

Learning resources are kept in the Knowledge bank module whose design is rooted in various theories. The elements in the resources are based on the design principles of multimedia presentation (Sweller, 1988) by organizing information (Mayer, 1996) because information processing employing audio, visual and animation can get more effectiveness than the processing by lecturing.

5. Evaluation Module

The function of the evaluation module is assessing reaction, learning achievement and behaviour of learners according to Kirkpatrick's evaluation model.

6.2 The results from experts evaluation

From evaluating the quality of the models by several experts, many issues are exposed as follows. Firstly, the model conforms to learning principles and theories utilized as the fundamental of synthesizing the model. Secondly, technologies used in the model are up-to-date, well-known and favourable; furthermore the theories used as the

fundamental of designing the model point to the suitability of media using. Thirdly, the scope of learning content is general standard for the subject of computer network; thus this work can be used extensively. Thus it is proper to use the model to develop a learning environment. For the usability of the model, the experts accept the model in a high level at 70.27 % overall. To sum up, there is high feasibility to decrease learners' weakness by using the model from this study.

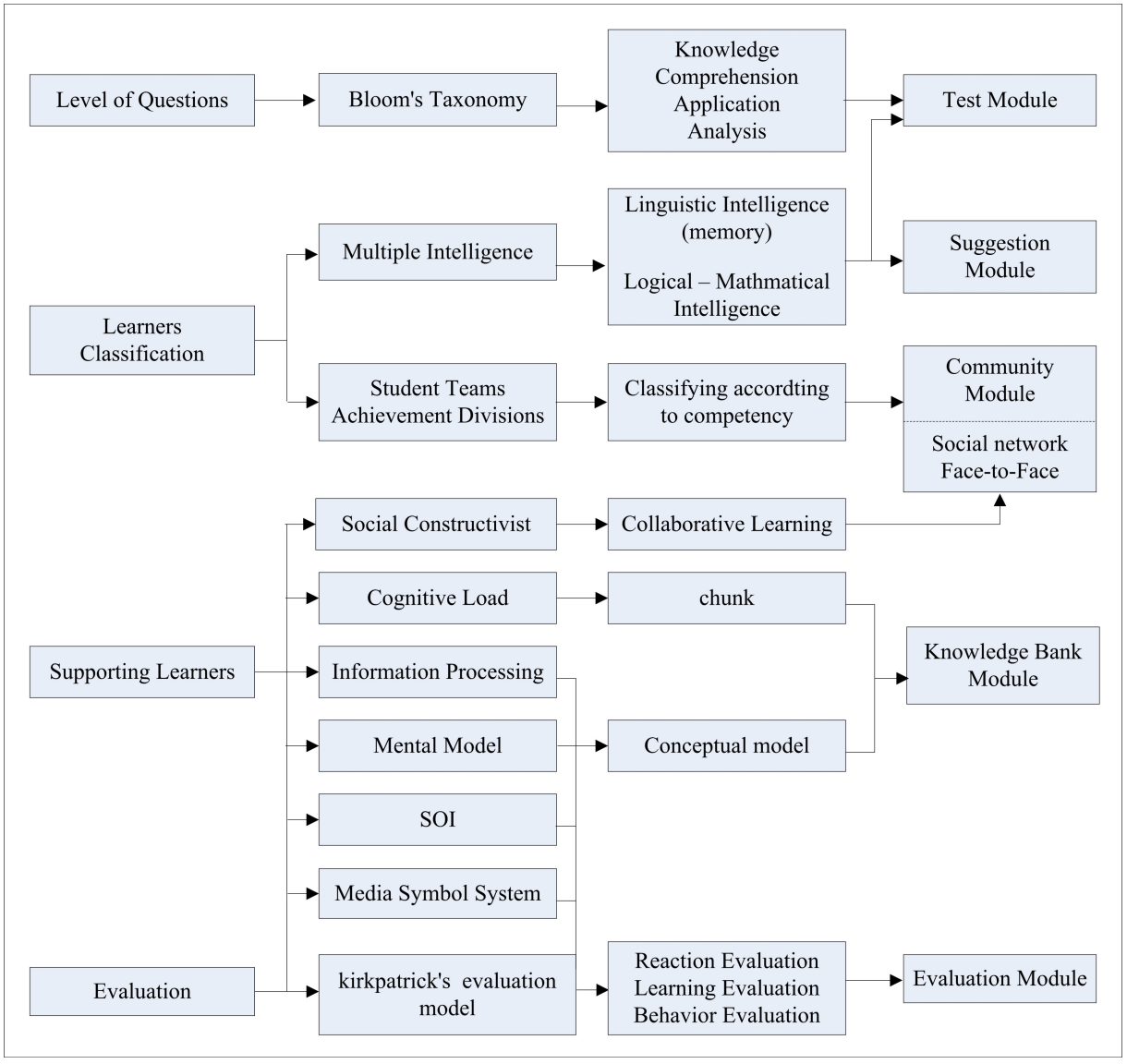

Figure1. Learning model framework

7. Summary and Concluding Remarks

Many major theoretical bases are used in designing the framework of the learning model. These are multiple intelligence, Bloom's Taxonomy, STAD, social constructivist, Cognitive load, mental model, SOI, Kirkpatrick's

evaluation model, media symbol system and information processing. The model rooted in the framework comprises of five modules that are Test Module, Evaluation module, Suggestion module, Community module and Knowledge bank module. The results derived from experts' evaluation are disclosed that the model is appropriate to 3 aspects that are (1) learning content, (2) design based on theories and (3) media and technology. Moreover the experts accept to the usability of the model in a high level.

For the future work, the learning model will be developed as a web-based learning environment; then this learning environment will be evaluated by experts for internal validation and tested with students studying in computer field in the Faculty of Science and Technology at NakhonRatchasima Rajabhat University for external validation (Deejring et al., 2012); besides the learning environment will be tested with students of other institutes to insist on the generalization of application.

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